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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,849	09/28/2001	Brian Ellis	608-312	2377

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EXAMINER	
OH, TAYLOR V	

ART UNIT	PAPER NUMBER
1625	6

DATE MAILED: 04/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/964,849	ELLIS ET AL.	
	Examiner	Art Unit	
	Taylor Victor Oh	1625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 September 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

The Status of the Claims:

Claims 1-23 are pending.

Claims 1-23 have been rejected.

Claims 8, 9 ,11, 19, 20, and 23 have been objected.

Specification

The disclosure is objected to because of the following informalities: a term "maximise" is written on page 2, line13.

Appropriate spelling correction is required.

Claims 8, 9 ,11, 19, 20, and 23 are objected to because of the following informalities:

In claims 8, 9 , 19, and 20, there are no punctuations at the end of the sentences.

In claim 23, a semicolon is used at the end of the sentence. Therefore, appropriate correction is required.

In claim 11, a phrase " and up to and including" is written. However, they are the improper expression of the range. Therefore, appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims 1-3 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for one catalyst , such as, $Mo_dV_b\ Au_dNb_eO_f$, or $Mo_dV_b\ P_dNb_eO_f$, does not reasonably provide enablement for all the catalysts known in the field of chemistry. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to include all the catalysts unrelated to the invention commensurate in scope with these claims. Furthermore, the instant specification fails to provide information that would allow the skilled artisan to practice the instant invention without **undue experimentation.**

Attention is directed to *In re Wands*, 8 USPQ2d 1400 (CAFC 1988) at 1404 where the court set forth the eight factors to consider when assessing if a disclosure would have required undue experimentation, citing *Ex Parte Forman*, 230 USPQ 546 (BdApls 1986) at 547 the court recited eight factors:

1) the quantity of experimentation necessary,

2) the amount of direction or guidance provided,

3) the presence or absence of working examples,

4) the nature of the invention,

5) the state of the prior art,

6) the relative skill of those in the art,

7) the predictability of the art, and

8) the breath of the claims.

In the instant case, the claim encompasses various catalysts. However, applicants' specification provide only two particular exemplified catalyst compounds. Furthermore, the catalyst compositions represent an unpredictable aspect in the art of organic chemistry . See Exparte Sizto, 9 USPQ2d 2081 (Bd. Of App. And Inter. March 1988). Thus, the specification herein have failed to provide sufficient working examples to support the use of various catalysts. Therefore, an appropriate correction is required.

Claims 1-3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Phrases " a pre-determined value" "concentration", "pressure", "temperature", and "residence time" are written. However, each of them are vague and indefinite. There is no specific pre-determined value associated with other parameters ,such as specific concentration, pressure, temperature, and residence time.
An appropriate correction is required.

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 4, 7 ,11-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCain, Jr. et al (U.S. 5,162,578) in view of Manyik et al (U.S. 4,899,003).

McCain, Jr. et al discloses a process of producing acetic acid by reacting ethane or ethylene and oxygen (see col. 1, lines 5-9) in a range of from 0.1 to 50 % (see col. 10, lines 15-17) and steam in a range of from 10 to 30 % (see col. 5 ,lines 29-30) in the presence of a catalyst system selected from the group comprising molybdenum, vanadium, gallium, palladium, niobium, silicon, indium , tungsten, and etc. (see col. 3 ,lines 10-27) at a temperature of from 200^0 to 400^0 C. and under a pressure of from 1 to 30 atmospheres (see col. 5 ,lines 55-60) at a GHSV of 200 to 3000 h^{-1} (see col. 10 ,lines 1-3). Furthermore, the reaction mixture in the reactor is in the ratio of one mole of ethane or ethylene to 0.01 mole to 3 mole of oxygen and zero to 4 mole or more water in the form of steam (see col. 9 ,lines 47-52).

The instant invention, however, differs from the Suzuki et al in that the oxidation of an alkane to the corresponding alkene and carboxylic acid is not mentioned; the ratio of alkene to carboxylic acid is in the range of 0.8 :1 to 1.4:1 ; the product stream comprises carbon dioxides in an amount of less than 15 mol. %.

Manyik et al discloses a process of producing ethylene and acetic acid by reacting ethane and oxygen in the presence of a catalyst system selected from the group comprising molybdenum, vanadium, , palladium, niobium, tungsten, and etc. (see col. 7 ,lines 1-13) at a temperature greater than 250^0 C. (see col. 5 ,lines 44-46) and under a pressure of from 1 to 40 atmospheres at a GHSV of 500 to 6000 h^{-1} (see col. 6 ,lines 49-54), thereby obtaining the molar ratio of alkene to carboxylic acid (12.11 : 4) in the total output (see col. 15, Table 4).

Furthermore, except for the first stage, the input gaseous stream of each stage contains ethane, ethyiene, acetic acid, CO_2, and gases, and water (see col. 4, lines 64-66); in addition, the amount of the water employed in the reaction process is between 0 and 10 mole percent of the input gaseous stream (see col. 6 ,lines 6-8), whereas the product stream comprises carbon dioxides in an amount of 1.27 mol. % (see col. 15, table 4). Moreover, the addition of water to the input gaseous stream of each stage results in a high acetic acid selectivity a low ethylene selectivity in comparison with the system without adding water between the stages (see col. 16, lines 27-31).

Concerning the ratio of alkene to carboxylic acid in the range of 0.8 :1 to 1.4:1, Manyik et al does teach the molar ratio of alkene to carboxylic acid (3 : 1) in the total output. However, the claimed ranges and prior art do not overlap but are close enough that one skilled in the art would have expected them to have the similar condition during the process in the absence of an unexpected result. Furthermore, the limitation of a process with respect to ranges of pH, time and a ratio does not impart patentability to a process when such values are those which would be determined by one of ordinary skill in the art in achieving optimum operation of the process. The ratio is well understood by those of ordinary skill in the art to be a result-effective variable , especially when attempting to control selectivity of a chemical process. Therefore, it would have been obvious to the skillful artisan in the art to have motivated to optimize the ratio between the carboxylic acid and the alkene in the Suzuki et al by a routine experimentation.

Manyik et al does teach the process of producing ethylene and acetic acid by reacting ethane and oxygen in the presence of the catalyst system comprising molybdenum, vanadium, , palladium, niobium, tungsten, and etc. at a temperature greater than 250^0 C. and under a pressure of from 1 to 40 atmospheres at a GHSV of 500 to 6000 h^{-1} . Also, McCain, Jr. et al discloses a process of producing acetic acid by reacting ethane or ethylene and oxygen, and steam in the presence of the catalyst system comprising molybdenum, vanadium, gallium, palladium, niobium, silicon, indium , tungsten, and etc. at a temperature of from 200^0 to 400^0 C. and under a pressure of from 1 to 30 atmospheres at a GHSV of 200 to 3000 h^{-1} .

Manyik et al does teach the use of ethane in the process of producing ethylene and acetic acid, whereas McCain, Jr. et al does point out that of either ethylene or ethane in the process of producing acetic acid. Both processes can be employed to produce acetic acid either by choosing ethane or ethylene. Furthermore, the Manyik et al does indicate that the addition of water to the input gaseous stream of each stage results in the high acetic acid selectivity with reducing the low ethylene selectivity. Therefore, it would have been obvious to the skillful artisan in the art to have motivated to incorporate the teachings of Manyik's et al ethane and addition of water to each stage into the McCain, Jr. et al process of producing acetic acid, thereby increasing the productivity of acetic acid.

Claims 2, 3, 5, 6, and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher et al (U.S. 3,458,406) in view of Manyik et al (U.S. 4,899,003).

Fisher et al teaches a process of separating methyl acetate and ethyl acetate from vinyl acetate prepared by reacting ethylene with acetic acid in the presence of a reduction-oxidation catalyst (see col. 1 ,lines 15-20).

The instant invention, however, differs from the Fisher et al in that the oxidation of an alkane to the corresponding alkene and carboxylic acid is not mentioned; the ratio of alkene to carboxylic acid is in the range of 0.8 :1 to 1.4:1 .

Manyik et al discloses a process of producing ethylene and acetic acid by reacting ethane and oxygen in the presence of a catalyst system selected from the group comprising molybdenum, vanadium, , palladium, niobium, tungsten, and etc. (see col. 7 ,lines 1-13) at a temperature greater than 250^0 C. (see col. 5 ,lines 44-46) and under a pressure of from 1 to 40 atmospheres at a GHSV of 500 to 6000 h^{-1} (see col. 6 ,lines 49-54), thereby obtaining the molar ratio of alkene to carboxylic acid (12.11 : 4) in the total output (see col. 15, Table 4).

Furthermore, except for the first stage, the input gaseous stream of each stage contains ethane, ethylene, acetic acid, CO_2, and gases, and water (see col. 4, lines 64-66); in addition, the amount of the water employed in the reaction process is between 0 and 10 mole percent of the input gaseous stream (see col. 6 ,lines 6-8), whereas the

product stream comprises carbon dioxides in an amount of 1.27 mol. % (see col. 15, table 4).

Concerning the ratio of alkene to carboxylic acid in the range of 0.8 :1 to 1.4:1, Manyik et al does teach the molar ratio of alkene to carboxylic acid (3 : 1) in the total output. However, the claimed ranges and prior art do not overlap but are close enough that one skilled in the art would have expected them to have the similar condition during the process in the absence of an unexpected result. Furthermore, the limitation of a process with respect to ranges of pH, time and a ratio does not impart patentability to a process when such values are those which would be determined by one of ordinary skill in the art in achieving optimum operation of the process. The ratio is well understood by those of ordinary skill in the art to be a result-effective variable , especially when attempting to control selectivity of a chemical process. Therefore, it would have been obvious to the skillful artisan in the art to have motivated to optimize the ratio between the carboxylic acid and the alkene in the Suzuki et al by a routine experimentation.

Manyik et al does teach the process of producing ethylene and acetic acid by reacting ethane and oxygen in the presence of the catalyst system comprising molybdenum, vanadium, , palladium, niobium, and tungsten. Also, Fisher et al does teach the process of separating methyl acetate and ethyl acetate from vinyl acetate prepared by reacting ethylene with acetic acid in the presence of the reduction-oxidation catalyst. The Manyik et al is directly related to the process of producing

intermediate compounds, such as ethylene and acetic acid , whereas the Fisher et al has focused the production of the final products, alkyl carboxylate and alkenyl carboxylate by using those ethylene and acetic acid intermediates. They are in a relationship between the intermediates and the final products. Therefore, if the skilled artisan in the art had desired to extend from the process of ethylene and acetic acid to that of producing both alkyl carboxylate and alkenyl carboxylate, it would have been obvious to the skillful artisan in the art to have motivated to incorporate the teachings of Manyik's et al into the Fisher et al process. This is because the skilled artisan in the art would expect the combined processes to be successful as shown in the Fisher et al process.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Murib (U.S. 4,499,301) discloses a process for preparing acrolein and acrylic acid by the oxidation of propylene in the presence of a catalyst composition containing a noble metal promoted by a solid acid consisting of mixed metal oxides at the reaction temperature at about 100^0- 250^0C..

Ushikubo et al (U.S. 5,380,933) discloses a process for producing an unsaturated carboxylic acid in which an alkane is subjected to a vapor phase catalytic oxidation reaction in the presence of a catalyst containing a mixed metal oxide comprising Mo, V, Te, and X at a reaction temperature of from 200^0- 550^0C..

Bartek et al (U.S. 5,198,580) discloses a process for partial oxidation of propane to yield acrylic acid, propylene, acrolein, acetic acid, and carbon oxides by the reaction of propane in admixture with a molecular oxygen containing gas in a reaction zone with a catalyst containing $Bi_dMo_c V_cA_dD_eE_f O$. at a pressure of 20 psig and a temperature of 400^0 C..

Caliahan (U.S. 2,941,007) discloses a method for producing an acrolein from propylene by catalytic oxidation using a catalyst consisting of bismuth molybdate and bismuth phosphomolybdate.

Suzuki et al(U.S. 5,405,996) discloses a process of producing acetic acid by reacting ethylene in a range of from 5 to 85 % by volume and oxygen in a range of from 1 to 15 % by volume and steam in a range of from 1 to 50 % by volume in the presence of a catalyst system selected from the group comprising molybdenum, vanadium, gallium, palladium, niobium, silicon, indium , tungsten, and etc. at a temperature of from 100^0 to 250^0 C. and under a pressure of from 1 to 30 kg/cm^2 at a GHSV of 300 to 5000 h^{-1}.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Taylor Victor Oh whose telephone number is 703-305-0809. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alan Rotman can be reached on 703-308-4698. The fax phone numbers

4/15/03

Alan L Rotman

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